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UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

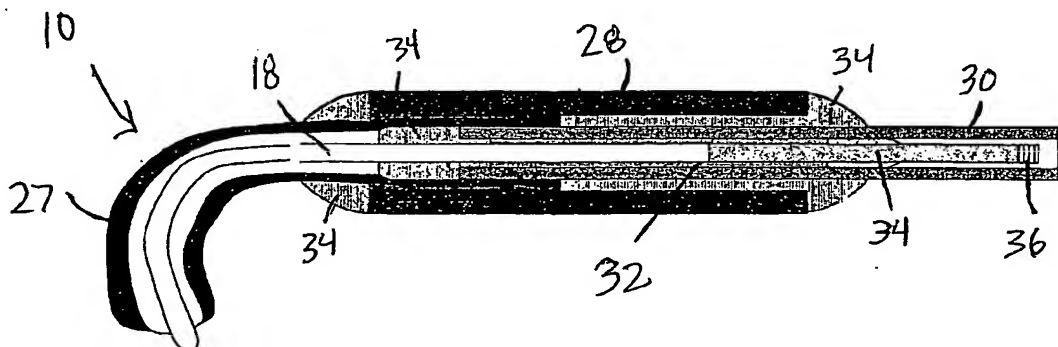
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European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
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SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii)) for the following designations AE,
AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,
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SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY,

[Continued on next page].

(54) Title: FIBER OPTIC TEMPERATURE SENSOR



(57) Abstract: A fiber optic temperature sensor (10) and system employ optical (fiber 34) and a fiber Bragg grating (36) using non-silica materials that can withstand temperature ranges extending well above the silica-imposed limit of 1,100 degrees C. The system measures the wavelength shift of light reflected from the fiber Bragg grating (36) and converts it into a temperature value. Specific optical fibers include sapphire, which can be used at temperatures approaching 1,800 degrees C, and yttria-stabilized zirconia (YSZ), which can be used at temperature in excess of 2,300 degrees C. One specific grating employs alternating layers of YSZ, with the percentage of yttria varying in the alternating layers to achieve the desired difference of refractive index, and another grating employs alternating layers of alumina and zirconia.

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KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ,

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/37303

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01K 11/32; 1/08; G02B 6/24, 1/00

US CL : 374/161; 385/12; 250/227.18, 227.23; 356/326

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 374/161; 120, 131, 159; 385/12; 250/227.18, 227.23, 227.14; 356/326, 43, 44, 45

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,024,488 A (Wu et al.) 15 February 2000 (14.02.2000), Col. 7, Lines 19-27, 44-52; Fig. 1.	1-3, 7-18, 22-42
Y	US 5,839,830 A (Young et al.) 24 November 1998 (24.11.1998), Col. 2, Lines 56-57.	1-3, 7-18
Y	US 6,029,115 A (Tracy et al.) 22 February 2000 (22.02.2000), the whole document.	22-42

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

03 December 2004 (03.12.2004)

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INTERNATIONAL SEARCH REPORT

PCT/US03/37303

Continuation of B. FIELDS SEARCHED Item 3:

USPAT, USPG-PUB, USOCR: fiber, fibre, optic, Bragg, grating, reflect, mirror, wavelength, shift, temperature, zirconia, sapphire, silica